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Rolling Robots

Students put wizardry on display as KSC hosts annual competition

It had all the sights and sounds of a typical high school sports competition: the color-coordinated banners, the throaty chants, the brassy pep band, the nervous chatter, the exultant high-fives and the disappointed frowns.

But this event, with its elements of a track meet and a basketball game, also had the aspect of a science fair. After all, the enthusiastic throng in the bleachers at the KSC Visitor Complex's Rocket Garden focused its gaze not on the competing students themselves but on a collection of mechanical gladiators operating on 12-volt batteries.

KSC hosted the Southeast FIRST Robotics Competition on March 9-11, the fourth straight year of the Center's involvement with the event. The competition brought together 29 teams representing 47 schools from Florida and seven other states. Winners advanced to the national championship to be held April 6-8 at Epcot Center.

The competition's founders intended to promote enthusiasm for science and engineering among high school students, and the scene in the Rocket Garden suggested they have been successful. Between

(See Robots, Page 3)

Astronaut David Brown, center, gets to know members of the ComBBat team from Titusville and Astronaut high schools during the robotics competition.

Mission update
STS-101

Shuttle managers have set a target launch date of no earlier than April 17 for Space Shuttle Atlantis on STS-101. The new date accommodates Shuttle processing and flight crew training requirements.

Space Shuttle Atlantis was scheduled at press time for rollout to Launch Pad 39A on March 24.

Landing is planned for April 28 at Kennedy Space Center.

STS-101 will prepare the International Space Station (ISS) for the arrival later this year of the Russian-made Zvezda service module. The second Shuttle docking with the ISS will include one space walk.

Magnetic mission set to fly

The IMAGE spacecraft, shown during processing activities at Goddard Space Flight Center, will capture pictures of the Earth's magnetosphere.

IMAGE will record halo around Earth

Having successfully measured most of the Earth's surface on STS-99, NASA now explores the planet's magnetic space environment. The "Imager for Magnetopause-to-Aurora Global Exploration" (IMAGE for short) is a spacecraft designed to study the global response of the Earth's magnetosphere to changes in the solar wind.

IMAGE was scheduled at press time to launch March 25 from Vandenberg Air Force Base in California. KSC's Expendable Launch Vehicle Program office will manage the launch for NASA.

The magnetosphere is an area of space around our planet that is

(See IMAGE, Page 2)

KSC produces 2nd bone marrow match

Elaine Wood, right, an employee of Yang Enterprises, Inc., meets with KSC's only previous bone marrow donor, Ed Markowski of NASA.

Another Kennedy Space Center employee, Elaine Wood, recently was notified that her marrow is an exact match for a person dying of leukemia. The "match" is with a 6-year-old boy diagnosed with acute lymphocytic leukemia.

Wood, an employee with Yang Enterprises, Inc., joined the National Marrow Donor Program (NMDP) during the 1997 KSC Marrow Registration Drive. Three years ago at the registration drive, Wood had a small sample of blood taken which was later typed and the information stored anonymously on the NMDP Registry. The preliminary analysis showed Wood is a perfect match for the young boy, with six out of six genetic markers.

The next step for Wood was to proceed with further confirmatory testing, including more blood samples that were taken at the KSC Occupational Health Facility. The samples will be analyzed thoroughly for the compatibility of additional blood components to confirm that she is the perfect candidate.

"I'm excited to be a perfect match for this 6-year-old boy," said Wood. "One day it could be my son or daughter that has a need for marrow. This is my gift."

KSC has had two additional employees in the past who matched all six Human Leukocyte Antigens (HLA), which are found on blood cells. However, alternate donors with perfect HLA matches were selected after further testing proved them to be superior matches.

After learning of her status, Wood met Ed Markowski, the first KSC employee to be an exact match for a leukemia patient. Markowski donated his marrow in January 1999 to Kevin Castine, a railroad worker from Champlaign, N.Y. Markowski and Wood were originally typed during the 1997 KSC Marrow Registration Drive.

If all goes well with the confirmatory testing, Wood's next step will be a complete physical examination and eventually "harvesting" of the life-saving marrow at St. Luke's Hospital in Jacksonville. The marrow will then be immediately transported to the 6-year-old boy.

Last month, KSC, in a new partnership with Patrick Air Force Base and Cape Canaveral Air Force Station, concluded its third Marrow Registration Drive. The campaign culminated with nearly 1,100 employee's names being added to the NMDP Registry.

Tickets for KSC Picnic go on sale

KSC Director Roy Bridges, third from left, purchases the symbolic first ticket to the KSC All-American Picnic. Members of the picnic planning committee, from left, are Warren Wiley, Michael Guzman, Roger Hall, Fran Brauer, Nancy Hoffman and Dick Lyon.

The KSC All-American Picnic 2000 has something for just about everyone: astronauts, sports and games, animals, rides, robots, music, cars, fishing and clowns — not to mention a chance to see co-workers and their families.

The picnic will be held Saturday, April 15 from 10 a.m. to 4 p.m. at KARS Park I in Merritt Island. Tickets are $4 for adults (ages 13 and up) and $3 for children (ages 3 to 12). Children under 3 are admitted free. Tickets can be purchased at NASA Exchange Stores, locations in most KSC major buildings and several Cape locations.

Many exciting events are planned for the day. There will be wildlife exhibits, including demonstrations by Thunderhawk Big Cat Rescue, a Native American group dedicated to the preservation of great cats, and Greyhound Pets of America. Recreational activities on the agenda include a kids' fishing tournament, softball and volleyball games, a skateboard demonstration and rock climbing. A car show also is planned.

A children's carnival, a petting zoo, clowns and rides will give the day something of a circus atmosphere. As always, musical entertainment will abound, with planned appearances by Max Q (the astronaut band) and Reflections, as well as bagpipers. The popular cultural cuisine displays again will give guests the chance to sample a variety of dishes.

And, of course, astronauts will be on hand to meet with employees and their families.

For a list of picnic events and a picnic map, visit the Web site: **http://www.ksc.nasa.gov/events/2000/picnic/**

IMAGE ...

(Continued from Page 1)

controlled by Earth's magnetic field. It helps keep out charged particles from the solar wind, including high-energy particles that come from solar flares and coronal mass ejections. The magnetosphere is not a perfect shield. When the Sun is very active, ionized gas is able to penetrate the magnetosphere and high-pressure solar winds can cause the magnetic field to be squeezed and buffeted.

During periods of gusty solar wind, powerful magnetic storms cause vivid auroras, radio and television static, power blackouts, and navigation problems for ships and airplanes with magnetic compasses. There can even be damage to satellites and spacecraft.

IMAGE will be launched into an orbit that loops from a low point of 600 miles to a high point of almost 27,000 miles. From that vantage point, IMAGE's instruments will look back and be able to see the inner structure of the magnetosphere.

Robots ...

(Continued from Page 1)

matches, members of the Space Coast FIRST team huddled around their bright pink RoccoBot like handlers around a boxer.

"For all of us who are into this kind of thing, we just love it," said Denny Caldwell, a Rockledge High senior on the Space Coast team. "This is heaven to us. This is what I'm going to be doing for the rest of my life, I hope."

KSC was a co-sponsor for 21 of the 29 teams, 16 of which were from Florida. In addition, 18 KSC employees served as mentors to local teams, guiding the designs of the robots. KSC awarded 20 grants of $5,000 each to entrants from Florida, Arkansas, Minnesota, Ohio, and South Carolina. In all, NASA sponsored more than 100 of the 491 teams in the national competition. KSC and three other NASA centers provided the use of facilities to another 35 teams.

Eduardo Lopez del Castillo of KSC's Technology Programs and Commercialization office has been a primary force in the competition's growth among Brevard County schools. He first began making presentations at local schools four years ago, and helped KSC become a regional host last year.

In addition, Lopez served this year as a mentor to the Space Coast FIRST team. Such is his rapport with the students from Rockledge and Cocoa Beach that they refer to him simply as "Ed."

"We have developed an incredible relationship, and I have seen them grow from little kids to very responsible people I can rely on," Lopez said. "I'm still in contact with some of the kids from the past teams, and many of them are involved in engineering."

The competition follows a format devised by For Inspiration and Recognition of Science and Technology (FIRST), a non-profit organization based in New Hampshire. The high school students, working with volunteer technical mentors, begin with identical crates of mechanical components supplied by FIRST and then spend six weeks constructing robots.

The robots can weigh up to 130 pounds and must start each match with dimensions in inches no larger than 30-by-36-by-60. Students operate their machines by remote control, manipulating joysticks from behind a Plexiglas wall.

The two-minute competitions take place in a rectangular space with two sets of racks at its center. The object is to make the robot pick up balls arranged against a wall and deposit them in the racks, with extra points awarded for the less plentiful black balls. Four teams compete at a time in alliances of two that aren't revealed until just before each match.

In addition, teams get extra points for having their robots on a ramp between the racks as the period ends. The largest bonus goes to a team whose robot grasps a bar connecting the racks and hangs from it as the time expires.

The temporary pavilion at the KSC Visitor Complex's Rocket Garden was a hive of frenetic activity as the matches took place in quick succession. Between matches, teams carried their robots to a nearby tent, where they lifted

ABOVE: Members of Voltage, the South Brevard FIRST Team, prepare a robot called Sparky for the Southeast Regional FIRST Competition. The team included students from Eau Gallie, Satellite, Palm Bay, Melbourne, Melbourne Central Catholic and Palm Bay high schools. The competition took place in the Rocket Garden at KSC's Visitor Complex.

BELOW LEFT: The robot Dr. Beevil, operated through remote control by members of the Bee Bots, scores points by dunking balls into a rack during a match. Four teams competed in a two-on-two arrangement during matches. The Bee Bots, one of 16 teams at the competition sponsored in part by Kennedy Space Center, hail from Morristown, Ind.

BELOW: Members of the ComBBat team follow the action intently during the first day of competition. The team included students from Astronaut and Titusville high schools. Sponsored by KSC, the team was taking part in the FIRST competition for the third straight year.

their machines onto tables and scrambled to make adjustments.

For robots in need of major repairs, KSC made its Prototype Laboratory available to the teams.

The robots themselves displayed as much individuality as the students who made them. Colors ranged from hot pink to neon green, with teams supplying such touches as a bright orange smiley face. The machines — amalgams of Plexiglas, aluminum, PVC pipes, rubber belts and bicycle chains — varied widely in the designs that were intended to capture the balls from the ground and lift them into the six-foot-high racks.

Jennifer Eggers, a Titusville High senior and a member of the ComBBat team for the third straight year, worked on the design team for "Tippy 2K" and operated a joystick during matches. Eggers said the project has managed to unite students from rival schools — Titusville and Astronaut.

"I love working together with the other people," Eggers said. "We have four really dedicated Boeing and NASA mentors, and we work with them every day at the Boeing shop. At first, I was like — I don't know about this. But I've been working on it for three years and now we're like a big family. Everybody is going to hate leaving."

The composition of the teams didn't fit stereotypes about "techno-geeks." Most teams included as many girls as boys, and Eggers was typical of many students in not having any background in engineering.

"It's a wide range, from artists to scientists," said Jason Mellen, a Palm Bay High freshman and a member of the South Brevard Voltage team. "It takes all kinds."

The overall winners of the regional competition were Benilde-St. Margaret's School of Mountain Home, Ark., sponsored by Baxter Engineering; St. Petersburg Lakewood and Osceola high schools, sponsored by Baxter Healthcare; and Williamston Career and Technology Center of Anderson, S.C., sponsored by KSC and Robert Bosch Corp.

The South Brevard entrant received a "Rookie All-Star" award. The Central Brevard entrant received the Most Photogenic award and advanced into the semifinal rounds. The CombBat Team of Titusville and Astronaut high schools will be competing in the Motorola Midwest Regional in Evanston, Ill., from March 23-25. The Space Coast FIRST Team of Rockledge and Cocoa Beach high schools will be competing in the New England Regional in Hartford, Conn., from March 30 to April 1. The three Brevard County teams will compete in the Nationals at Epcot Center on April 6-8.

"I would like to thank the many volunteers from NASA, contractor organizations and the community who helped make the FIRST Regionals at KSC such a huge success," Center Director Roy Bridges said. "Without their assistance, an event of this magnitude would not be possible."

TOP: Four teams prepare to put their robots to work during a trial match. Teams are placed in "alliances" of two during competitions but don't learn of the pairings until just before the match begins.

ABOVE: Students from the Orange Crusher team make modifications to their robot, Rust Bot, during the FIRST competition. The team from Winter Springs and Lake Howell high schools had one of the most distinctive-looking entries at the event.

ABOVE LEFT: Members of the team from Orlando Edgewater High School get help from employees in KSC's Prototype Laboratory while making repairs to their robot, HERO. The Prototype Lab contribute repair services to any teams in need during the competition.

BELOW: Students from one of the winning teams, Heat Wave, receive congratulations from judges and KSC officials, including Deputy Director for Business Operations James Jennings. The team includes students from Lakewood and Osceola high schools in Pinellas County.

Fertilizer-producing filter added to Pad 39A

The next Space Shuttle mission will be devoted to the continued growth of the International Space Station. In an indirect way, the mission also will contribute to the growth of oranges here on Earth.

A system for converting vapors from the Shuttle's hypergolic oxidizer into fertilizer was installed at Launch Pad 39A in early March. Already in use, it will receive its biggest test during fueling operations for STS-101.

The installation of the Improved Nitrogen Tetroxide Scrubber follows a five-year process of development and production. The concept — devised by Clyde Parrish, formerly of Dynacs Engineering Co. Inc., and now with NASA — arose from consulting work he had done in the 1970s involving chemical separations. NASA/KSC engineer Dale Lueck contributed plans for a hydrogen peroxide controller, and Dynacs produced the scrubber system under the direction of the NASA Instrumentation Lab. It was installed by United Space Alliance.

"It's good to see something you've been a part of go to completion," Parrish said. "We will be happy to see this all come together and operate like we expected and as the tests indicated it would."

The Space Shuttle uses nitrogen textroxide as the oxidizer for the hypergolic propellant for its on-orbit reaction control system. When the oxidizer is transferred from ground storage tanks into the Shuttle storage tanks — and during maintenance operations — some nitrogen tetroxide vapor develops as a by-product. KSC has used a scrubber system since the 1980s to capture the toxic vapor, preventing it from escaping into the atmosphere.

The new control system traps the vapor in water and then uses hydrogen peroxide to produce nitric acid. The addition of another compound, potassium hydroxide, converts the nitric acid into potassium nitrate, a commercial fertilizer.

Plans call for the resulting fertilizer to be used on the orange groves that KSC leases to outside companies. Parrish said the fertilizer will replace 10 percent of the amount purchased at KSC, resulting in an annual savings of approximately $20,000. Equally important, the conversion process eliminates KSC's second largest source of toxic waste and saves about $60,000 on disposal costs.

The Nitrogen Tetroxide Scrubber, shown at top on a trailer, has been installed in the Oxidizer Farm at Launch Pad 39A.

Parrish said the system automatically transfers the fertilizer produced during loading or maintenance operations into a trailer stationed nearby. Once the trailer has been filled, the fertilizer will be taken to its destination. Parrish estimated that preparations for STS-101 will produce enough fertilizer to fill two trailers.

"The system is designed so that when you start the scrubbing operations it automatically comes on and controls the process," Parrish said. "Its operation is essentially transparent to the workers. It automatically offloads the scrubber sump to the trailers. No one needs to worry about it until the receiving trailer is full."

Hypergolic propellants — those that generate power through chemical reactions — produce emissions not only in flight preparations at the pad but also in maintenance operations at other locations, including the Orbiter Processing Facility and the HMF. Scrubbers are in place wherever hypergolic propellants are used. Once the new control system at the pad proves successful, KSC will have the option of developing and installing similar devices on its other scrubbers. The new system reduces emissions to 10 percent or less of the previous levels.

The Air Force has talked to KSC officials about using the system on launch pads at Cape Canaveral Air Force Station, although no plans exist yet. The system also could be used in the future at other NASA launch sites and test facilities.

The innovation also has commercial potential. Parrish noted that many industries — including power plants and metal finishing operations — use processes that produce oxides of nitrogen. Should KSC license the technology to businesses, the resulting royalties would make the system even more financially beneficial.

Fair gives employees look at United Way services

Kennedy Space Center and Cape Canaveral Air Force Station would like to invite all employees to come to the Employee Information FAIR (Free Access to Information and Referrals). The FAIR is being held March 28 at the O&C Building Mission Briefing Room and the lobby of the Launch Control Center and March 30 at Cape Canaveral Air Force Station Hangar F from 9 a.m. to 2 p.m. each day. This is the first year a joint KSC/CCAFS event is being sponsored.

On March 28 at 10 a.m., KSC Director Roy Bridges and 45th Space Wing Commander Brig. Gen. Donald Pettit will make remarks at the Mission Briefing Room. They will then visit the FAIR at the LCC. They will also speak at Hangar F on March 30 at 10 a.m.

The Employee Information FAIR features 50 United Way community service vendors. Carol Cavanaugh, chair of the Community Relations Council, said: "You might not need these services now, but this is your chance to find out who to call if you need them in the future."

Sound too good to be true? A free event held each year just as a service to employees? That's right. Take advantage of this opportunity to learn about the services in our community to help you and your family in a trying situation. KSC even has buses running between the Launch Control Center and the Operations and Checkout Building. Additionally, you can enjoy chair massages, sample chiropractic adjustments and win great door prizes.

Event sponsors are KSC Community Relations Council in conjunction with Cape Commander Community Outreach Council, and United Way and Community Services Council.

KSC officials prepare for dry season

The phrase "hazardous fuel" is familiar to KSC workers involved in processing space vehicles. But in certain conditions, the phrase applies to entirely different materials found in abundance on the Center and also in need of careful management.

Typical winter weather yields dry conditions throughout Central Florida, KSC and the Merritt Island National Wildlife Refuge (MINWR), increasing the possibility of wildfires. Wooded areas lacking in moisture can become potential kindling.

KSC covers 140,000 acres, with only about 10,000 acres developed for mission operations and support. That leaves a considerable expanse of woodlands, which become vulnerable to wildfire threats during dry periods. That possibility lies behind the controlled burns sometimes conducted by officials from the refuge, with which KSC shares boundaries.

"The reason for burning is to restore some value as scrub jay habitat and also to reduce the hazard fuel danger," said Kevin Walsh, fire management officer for the refuge.

But the dryness has reached the point that the prescribed fires can no longer be managed safely. Barring drastic changes, KSC has seen its last controlled burn of the season.

After conducting some small fires earlier in the winter, the Refuge's Fire Management Office managed a fire in early March that covered nearly 1,000 acres southeast of the Launch Complex 39 turn basin. Walsh said the fire was controlled with four fire engines, a bulldozer, a water-bearing helicopter and at least 12 firefighters on the ground.

Walsh's office planned a fire of similar size for woods near the intersection of Schwartz Road and Kennedy Parkway the following week. But a series of events halted those plans. Complications in planning with Cape Canaveral Air Force Station arose, and an executive order from the Florida governor's office put that and future controlled burns on hold. In addition, wildfire concerns have led to increased restriction by regional authorities.

Extremely low rain totals during January and February prompted a rise in the Keetch-Bryam Drought Index for most of Central Florida.

Controlled burns, such as this one in 1997, are intended to preserve animal habitat and reduce the risk of wildfires.

The index, which measures moisture levels in the soil, ranges from zero to 800, with 600 considered the threshhold of dangerously dry conditions.

In early March, most of Brevard County was in the 500 range and rising. But Walsh said measurements taken near the Shuttle Landing Facility showed an index of 350-400 — significantly less dry. By mid-March, however, the reading was nearing 600, the level beyond which controlled burns are considered unsafe in upland areas.

Walsh said considerable planning goes into all controlled burns on KSC property. His office writes a plan, taking into account such factors as soil conditions, smoke dispersal and the impact on wildlife.

Once the plan is complete, Walsh must submit it to KSC officials for approval. Of course, all prescribed burns are planned around launch and processing activities both at KSC and Cape Canaveral Air Force Station.

Before the fire is lit, managers make sure the designated burn area is surrounded by buffers — either natural (such as bodies of water) or man-made (such as bulldozed trenches). Walsh's crew starts the fire either from the edges with a "drip torch" or at a more central point by using a flamethrower.

The early March burn reached the base of a tree bearing an active eagle nest, though the birds were not harmed. Walsh said he understands the concerns of those who wonder what effect the fires have on animals. But he said uncontrolled fires would do far more damage on lands that are home to threatened or endangered species.

"I've been burning for 25 years, and I've seen very little in the way of wildlife mortality," Walsh said. "In the long run, the benefit for improved habitat is good for wildlife overall."

New food contractor set to deliver changes

Anybody order a pizza? That will be a possibility in the future, one of several changes in store as a result of a new food services contract.

Beginning April 1, Lackmann Culinary Services of Woodbury, N.Y., will take over the operation and management of the KSC Food Service Program, which consists of seven separate food service units, two mobile service units and a central warehouse.

Lackmann received a four-year contract, with three two-year option periods extending into 2010.

In addition to the day-to-day feeding of KSC's 14,000 employees, Lackmann also will provide catering services for dinners, receptions and other special events at the Center. The company also will be providing mobile concessions for visitors attending Space Shuttle launches and introducing a pizza delivery concept never before offered to KSC employees. Lackmann also is planning to build and operate an on-site, drive-through convenience store.

Lackmann officials said they will emphasize healthy offerings in their menus, with all the cafes serving subs and wrap sandwiches. During the first three days of the new operation, food sampling will be offered in all the cafes.

In addition Lackmann will be updating the look of all the cafeterias.

Lackmann operates 74 accounts nationwide with an annual sales volume of $85 million.

John F. Kennedy Space Center

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